Case Study on TDS and Indirect Potable Reuse: Using TDS Mass Balances to Determine Surface Water Augmentation Limitations

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Project Drivers

- Wastewater Plant Capacity Expansion
- Maintain Water Quality Goals
- Meet Water Supply Demands
Project Driver: WWTP Expansion Timeline

City has Exceeded the 75% Capacity Limit (5.6 MGD)

Projected to Exceed 90% by 2022 and must be in construction of additional WWTP capacity (6.75 MGD)

Existing Permitted Average Day Flow Capacity = 7.5 MGD
Project Driver: Leverage Expansion for Water Supply

Water Supply and Demands
City of Cleburne
Updated 2/27/18

Need additional Water Supply by 2022
Salt may be concentrated by several factors.
Typical Salt Accumulation in a Municipal System

- Water Treatment Plant
- Wastewater Treatment Plant
- Water Resource Recovery Facility

"De Facto" TDS Cycle

Reuse TDS Cycle
How the Salt Piles in

- Indirect Potable Reuse
- Industrial Reuse
- Industrial Contribution
- High-TDS Groundwater
- High-TDS River Basin
Cleburne was an early adopter of reuse, and now looks to expand the practice.
Dealing with Outfall Limits

Outfall 001 – 10/15/3 mg/L
Outfall 003 – 5/5/1.9 mg/L

No current Nutrient Limit

Potential TDS Limit
Approach for Evaluating Impact of Reuse

1. Develop Water Demand Projections

2a. Fill the Supply Gap

2b. Treatment Alternatives

3. Are Water Quality Goals Met?

Adjustments
1. Water Demand Projections

- **Demand**
  - Projected water demand from 2015 to 2045.

- **Supply/Demand**
  - MGD (Million Gallons per Day)

- **Existing Raw Water Supply**
  - Current raw water supply capacity.

- **Existing Industrial Reuse**
  - Current industrial reuse capacity.

The chart shows the expected supply and demand for water over the years, with a focus on the difference between supply and demand, highlighting the need for planning and potential solutions to meet future demands.
2a. Fill the Supply Gap
3. Are Water Quality Goals Met?
3. Are Water Quality Goals Met?

![Graph showing Max IPR Flow, MGD at which TDS limit is exceeded from 2015 to 2040]
1. Adjust Demand Assumptions

What if Industrial Growth Isn’t as High?
1. Adjust Demand Assumptions

What if it is wetter / drier than normal?
What if Industrial Pretreatment Occurred?
2a. Adjust Supply

New Raw Water Source
- Similar TDS as Current
- High Yield
  - High Cost

New Groundwater Source
- Higher TDS than Current
- Low Yield
- Low Cost

New Treated Water Source
- Out-of-Basin Low TDS Water
- High Yield
- Moderate Cost

What if different Source Waters Were Used?
Cleburne Identified a Win/Win Solution

- City needed to fill water supply gap
- City needed to expand WRRF
- TDS limited reuse aspirations
- Solutions to manage TDS limitations were found
  - Expansion of existing WRRF to supply reclaimed effluent to reservoir
  - Industrial pretreatment of two industries to reduce TDS throughout system
  - Lower TDS water from out-of-basin planned
Reuse Requires Thinking of the *Interconnected* Water System

Questions?

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